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ORIGINAL ARTICLE

Subtidal stromatolites from the Sinemurian of the Lusitanian Basin (Portugal)

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Abstract Well-preserved dome-shaped carbonate stromatolites occur in the lowermost part of the Sinemurian of the Lusitanian Basin (Portugal), at S. Pedro de Moel region (W of the basin). Deposition in the region took place on a westward-dipping carbonate ramp. The stromatolitic mounds are not found anywhere else in the Sinemurian of the basin and therefore are regarded as specific bioevents. In contrast to marginal-marine stromatolitic crusts, subtidal carbonate mounds other than sponge-mounds have been seldom reported in the Lower Jurassic, in particular in the Sinemurian, either from Europe or North-Africa. Therefore, the case documented here contributes to enhance the knowledge on stromatolites of this age in the Peri-Tethyan and Proto-Atlantic regions. The depositional setting of the studied succession is interpreted as a mainly low-energy, restricted marine one, punctuated by higher-energy episodes and, locally, subjected to more open marine influence. The existence of a topographic high and detached shoals at a more distal location of the ramp is likely, considering regional seismic evidence, the record in offshore (to the W) wells of peloidal/ooid wacke-packstones with detrital quartz and occurrence of a few ooid grainstones in the studied section. The inferred positive relief would act as a physical constraint that, coupled with the low-gradient of the ramp, defined an embayment-like environment in which the prevailing ecological conditions must have been, for the part of the succession bearing the stromatolites, unfavorable for many benthic organisms, favoring the microbial community. The upper part of the succession suggests stepwise environmental openness to more marine influence alternating with frequent environmental restriction.

Keywords Stromatolites · Restricted-marine environment · Palaeoecology · Sinemurian · Portugal

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Introduction

Microbial-related sedimentary carbonates have long been recognized, but scientific interest and consequently specialized literature on carbonate microbialites have clearly increased over the last 10–15 years (e.g., the overview issues edited by Monty et al. 1995; Reitner and Neuweiler 1995; Riding and Awramik 2000; Camoin and Gautret 2006; and many references therein). Some research has been more focused on the biological diversity of microbial communities and their biogeochemical functioning—either on the biogeochemical processes themselves (biomineralization and organomineralization mechanisms), or on tentatively deciphering the roles of different bacteria and microbes in carbonate genesis and diagenesis (e.g., Berner 1971; Macintyre 1985; Chafetz 1986; Burne and Moore 1987; Sun and Wright 1989; Reitner 1993; Reitner and